

Fermilab
FY2002 Self-assessment
Process Assessment Report
For
Division/Section: Particle Physics Division

Date: September 30, 2002

Division/Section performing assessment:

Particle Physics Division (PPD)

Name of organization that owns assessed process

PPD CMS Department / U.S. CMS Project Office

Organization Strategy

The U.S. CMS Construction Project is the sole mission of the CMS Department's U.S. CMS Project Office, which is the owning organization. The processes under assessment are the key measures of performance for the U.S. CMS Construction Project, and a positive assessment on these processes provides a measure of the CMS Department's ability to achieve success on its mission.

Names of Personnel on Assessment team

Dan Green
Mark Reichenadter

Name of process assessed

U.S. CMS Construction Project

Brief description of process to be assessed

The Compact Muon Solenoid (CMS) will be a large, general-purpose detector used to observe very high-energy proton-proton collisions at the Large Hadron Collider (LHC), now under construction at CERN, the European Laboratory for Particle Physics, near Geneva, Switzerland. The detector is being built by a large international collaboration, including over 335 U.S. physicists from 35 universities and Fermi National Accelerator Laboratory. The U.S. CMS Collaboration comprises twenty percent of the CMS collaboration and will provide a comparable fraction of the detector components' design, procurement, fabrication, assembly, testing, and installation through the U.S. CMS Construction Project.

The U.S. CMS Construction Project, funded jointly through the Department of Energy (DOE) and the National Science Foundation (NSF) has a Total Project Cost (TPC) of \$167.25M. The U.S. CMS Construction Project is managed through the U.S. CMS Project Office, and provides support and coordination to the U.S. CMS Collaboration. The U.S. CMS Construction Project, baselined in June 1998, and scheduled to be completed in September 2005, is currently ~70% complete. On cost, on schedule.

1. Are metrics associated with this process? If so, what are they?

- The U.S. CMS Construction Project is required by the U.S. CMS Construction Project Management Plan to report its technical, cost, and schedule status and progress on a monthly basis. For this indicator, we will measure our performance by how many monthly reports are published on time per year. 'On time' is defined as by the end of the following month (i.e., August 2002 Report is published by the end of September 2002). We will assess our performance according to the following;
 - ✧ 9 of 9 = Excellent
 - ✧ 8 of 9 = Good
 - ✧ 7 of 9 = Marginal
 - ✧ 6 of 9 = Unsatisfactory
- The U.S. CMS Construction Project is required to report monthly 'earned value' data on the U.S. CMS Construction Project through the DOE's Project Assessment Reporting System (PARS). For this indicator, we will measure our performance by how many PARS reports are sent to DOE on time per year. On time is defined as by the end of the following month (i.e., August 2002 PARS Report is published by the end of September 2002). We will assess our performance according to the following;
 - ✧ 9 of 9 = Excellent
 - ✧ 8 of 9 = Good
 - ✧ 7 of 9 = Marginal
 - ✧ 6 of 9 = Unsatisfactory
- The U.S. CMS Construction Project is required by the DOE and NSF to hold two comprehensive reviews (one major, one minor) per year over the duration of the U.S. CMS Construction Project and to report the technical, cost, and schedule status and progress of the Project. For this indicator, we will measure our ability to respond to the committee's recommendations within three months. We will assess our performance

on a percentage basis comparing the number of action items responded to by the next DOE/LHC Status Review (typically three months later) versus the total number of action items with the following ratings;

- ✧ 100% = Outstanding
 - ✧ <100 to 90% = Excellent
 - ✧ <90 to 80% = Good
 - ✧ <80 to 70% = Marginal
 - ✧ <70% = Unsatisfactory
- The U.S. CMS Construction Project is required by the Fermilab Directorate to hold regular Project Management Group Meetings (PMG's) that are intended to address the day-to-day management and coordination issues impacting the U.S. CMS Construction Project. For this indicator, we will measure our performance by how many PMG's are scheduled per period. We will assess our performance according to the following;
 - ✧ 8/9 of 9 = Outstanding
 - ✧ 6/7 of 9 = Excellent
 - ✧ 4/5 of 9 = Good
 - ✧ 2/3 of 9 = Marginal
 - ✧ 0/1 of 9 = Unsatisfactory
 - The U.S. CMS Construction Project finds it essential to meet annually with the DOE and NSF Base Program Management to discuss the needs and challenges that face the U.S. CMS Construction Project that must be supported from DOE and NSF Base Contracts. We will assess our performance according to the following;
 - ✧ 1 of 1 = Excellent
 - ✧ 0 of 1 = Marginal
 - The U.S. CMS Construction Project finds it essential to maintain a high quality, robust website to be used as the primary repository of information on the U.S. CMS Construction Project. We will assess our performance according to the following percentage of active server time;
 - ✧ 100-99% = Excellent
 - ✧ <99-95% = Good
 - ✧ <95-90% = Marginal
 - ✧ <90% = Unsatisfactory

For the six indicators described above, we use a weighted-matrix analysis to derive each indicator. The weighted-matrix is as follows;

- ✧ 20% U.S. CMS Construction Project Monthly Report
- ✧ 10% U.S. CMS Construction Project Assessment Reporting System (PARS)
- ✧ 30% DOE/NSF Reviews of the U.S. CMS Construction Project
- ✧ 20% U.S. CMS Project Management Group Meetings
- ✧ 10% U.S. CMS Construction Project Base Program Assessment
- ✧ 10% U.S. CMS Detector Project Website
- ✧ With each indicator receiving the following rating values;
 - Outstanding = 5.0
 - Excellent = 4.0
 - Good = 3.0
 - Marginal = 2.0
 - Unsatisfactory = 1.0

The overall adjective of the grade will be compiled from the indicator individual assessments and defined as follows;

- Outstanding = 4.5-5.0
- Excellent = 4.4-3.5
- Good = 3.4-2.5
- Marginal = 2.4-1.5
- Unsatisfactory = 1.4 and below

2. What are the names of the procedures associated with this process?

- U.S. CMS Construction Project Monthly Report
- U.S. CMS Construction Project Assessment Reporting System (PARS)
- DOE/NSF Reviews of the U.S. CMS Construction Project
- U.S. CMS Project Management Group Meetings
- U.S. CMS Construction Project Base Program Assessment
- U.S. CMS Detector Project Website

3. Are these procedures being followed? Are they current?

All procedures listed above are being followed and are actively employed to manage the U.S. CMS Construction Project.

4. Describe the methodology used to assess this process.

For the U.S. CMS Monthly Report and the PARS data these processes have periodic reporting requirements, once a month. We looked at how many reports were published on time each month and compared that number to the requirements.

For the DOE/NSF Reviews of the U.S. CMS Construction Project, we look at the number of action items from each review and the number responded to by the next DOE/NSF Status Review. We do not assess the number of action items since this action items varies by committee and also by specific phase of the project.

For the PMG's and Base Program Assessment, since these meetings typically cover a varying set of issues, we determined to assess the number of meetings that actually took place versus a baseline plan.

For the website, we will note the average 'up-time' and users ability and willingness to use the website as a common repository of information on the U.S. CMS Construction Project.

5. Results of the assessment:

Indicator #1: The U.S. CMS Construction Project to report its technical, cost, and schedule status and progress on a monthly basis.

Results: For the period between 01 January 2002 and 30 September 2002, the CMS Department presented nine monthly reports for nine consecutive months. All reports were available to the project's sponsors (DOE/ NSF management), its

users (CMS Collaboration) and external and internal management teams. The existing monthly report is found to be a useful way to convey the latest information on the U.S. CMS Project to all parties. No deficiencies have been noted, and the process is working well.

Adjectival Rating: Excellent.

Indicator #2: The U.S. CMS Construction Project to reports its 'earned value' performance into the DOE's Project Assessment Reporting System (PARS) on a monthly basis.

Results: For the period between 01 January 2002 and 30 September 2002, the CMS Department reported 9 times for 9 consecutive months. All reports were available to the DOE management. No deficiencies have been noted, and the process is working well.

Adjectival Rating: Excellent.

Indicator #3: The U.S. CMS Construction Project is required by the DOE and NSF to hold two comprehensive reviews (one major, one minor) per year over the duration of the U.S. CMS Construction Project and to report the technical, cost, and schedule status and progress of the Project.

Results: For the period between 01 January 2002 and 30 September 2002, the CMS Department conducted one major comprehensive review of the U.S. CMS Project (June 5-6, 2002). 21 action items were cited in this review, of which 20 have been responded at the next Status Review.

Adjectival Rating: Excellent.

Indicator #4: The U.S. CMS Construction Project is required by the Fermilab Directorate to hold regular Project Management Group Meetings (PMG's) which are intended to address the day-to-day management and coordination issues impacting the U.S. CMS Construction Project.

Results: For the period between 01 January 2002 and 30 September 2002, the CMS Department conducted four PMG's meetings with the Directorate. There has been some difficulty scheduling these meetings where all parties are available. This is mostly driven by the high travel requirements of the U.S. CMS Project Management. When PMG's must be cancelled, U.S. CMS has followed up with impromptu meetings with the Directorate to keep all parties informed of the most recent developments.

Adjectival Rating: Good

Indicator #5: The U.S. CMS Construction Project finds it essential to meet annually with the DOE and NSF Base Program Management to discuss the needs and challenges that face the U.S. CMS Construction Project that must be supported from DOE and NSF Base Contracts.

Results: For the period between 01 January 2002 and 30 September 2002, the CMS Department met with DOE and NSF management for the Base Program Support in Germantown, MD on September 18, 2002. This is an essential meeting given the need of high level post-docs and physicists to install, test and commission the CMS Detector. These scientific resources are under the direction of the agency managers for the Base Program and not the U.S CMS management, making this meeting necessary. This year's meeting, like subsequent meetings, provided useful feedback to the agencies as well as the U.S. CMS Project on the needs of each entity. No deficiencies have been noted, and the process is working well.

Adjectival Rating: Excellent.

Indicator #6: The U.S. CMS Construction Project finds it essential to maintain a high quality, robust website to be used as the primary repository of information on the U.S. CMS Construction Project.

Results: For the period between 01 January 2002 and 30 September 2002, the CMS Department maintained a U.S. CMS website with server capabilities. The website was operating and available to the U.S. CMS Collaboration >99% of the period. Some unscheduled failures of the website occurred with required rebooting by the U.S. CMS Project Office. Furthermore, the server has been recently upgraded to provide greater storage and transfer-rate capabilities. The U.S. CMS website <http://uscms.fnal.gov/default.html> continues to be our best form of electronic storage and transfer of large documents within the collaboration. No deficiencies have been noted, and the process is working well.

Adjectival Rating: Excellent.

Overall assessment of the U.S. CMS Detector Project:

	<u>Weight</u>	<u>Grade</u>	<u>Weight x Grade</u>
<u>U.S. CMS Monthly Report</u>	<u>.20</u>	<u>4.0</u>	<u>0.8</u>
<u>U.S. CMS PARS</u>	<u>.10</u>	<u>4.0</u>	<u>0.4</u>
<u>U.S. CMS DOE/NSF Reviews</u>	<u>.30</u>	<u>4.0</u>	<u>1.2</u>
<u>U.S. CMS PMG</u>	<u>.20</u>	<u>3.0</u>	<u>0.6</u>
<u>U.S. CMS Base Program Review</u>	<u>.10</u>	<u>4.0</u>	<u>0.4</u>
<u>U.S. CMS Website</u>	<u>.10</u>	<u>4.0</u>	<u>0.4</u>
<u>Total U.S. CMS Construction Project</u>	<u>1.00</u>		<u>3.8</u>

Total U.S. CMS Construction Project Rating = 3.8 (Excellent)

Identified opportunities for improvement

Metric #4. The PMG meetings are scheduled for the last Friday of each month. The identified problem is the overlapping travel of the U.S. CMS managers and the Fermilab Directorate. While a PMG each month would be considered excessive, four of nine PMG's in the past nine months is not our best performance. We will work to achieve 9/12 PMG's in FY03 by the following (1) making a more serious effort to keep to the PMG schedule, (2) use of teleconferences and videoconferences in lieu of live meetings, and (3), when (1) and (2) are not possible, we will augment the regular PMG's by impromptu meetings with the Directorate at different times from the normal PMG schedule.

Schedule for implementation of improvements

Metric #4. Immediately.

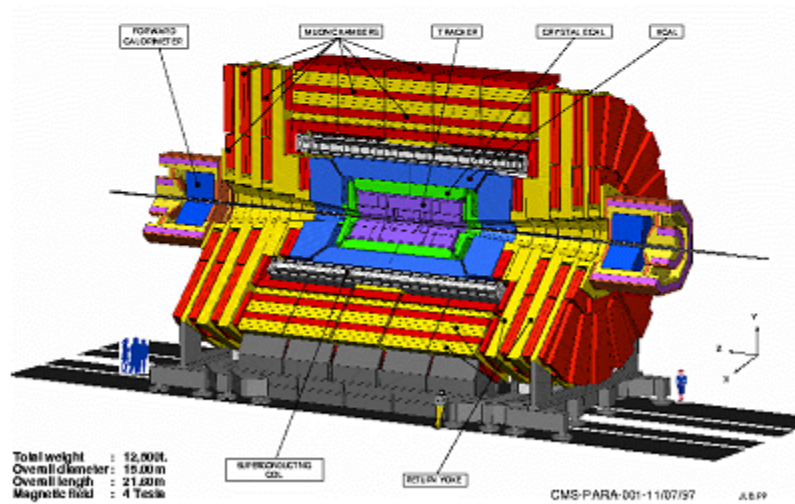
Status of improvements from previous assessment

Metric #4. Not Applicable.

Attachments (supporting data, worksheets, reports, etc.)

Metric #1. U.S. CMS Monthly Report Attachments.

US - CMS
Compact Muon Solenoid Detector
Monthly Report
for
Period Ending August 31, 2002



AY\$	Cost Performance Report for Cumulative Month Ending August 2002								AY\$
WBS	BCWS	BCWP	ACWP	CLAC	SV	CV	BAC	EAC	VAC
1 - EMU	\$30,314,105	\$28,440,199	\$25,781,473	\$19,153,580	(\$1,873,906)	\$2,658,726	\$39,146,711	\$39,579,372	(\$432,661)
2 - HCAL	\$36,408,458	\$31,302,305	\$26,975,773	\$21,720,021	(\$5,106,153)	\$4,326,531	\$41,077,208	\$41,321,702	(\$244,494)
3 - TRIDAS	\$7,324,803	\$5,365,402	\$4,639,712	\$4,072,630	(\$1,959,401)	\$725,690	\$12,277,748	\$12,097,158	\$180,590
4 - ECAL	\$8,238,537	\$7,141,659	\$5,512,358	\$4,891,265	(\$1,096,878)	\$1,629,301	\$12,585,869	\$12,034,082	\$551,786
5 - FPIX	\$2,468,540	\$2,057,289	\$1,766,614	\$1,484,223	(\$411,251)	\$290,675	\$7,267,588	\$7,343,704	(\$76,115)
6 - CP	\$22,816,273	\$22,659,168	\$21,244,673	\$20,032,063	(\$157,105)	\$1,414,495	\$23,000,000	\$23,515,569	(\$515,569)
7 - PO	\$5,060,926	\$4,942,978	\$4,184,934	\$1,158,348	(\$117,948)	\$758,043	\$6,788,209	\$6,657,356	\$130,852
8 - SITrkr	\$1,269,816	\$740,541	\$626,077	\$194,507	(\$529,275)	\$114,465	\$3,317,766	\$3,326,050	(\$8,284)
US CMS	\$113,901,457	\$102,649,541	\$90,731,614	\$72,706,637	(\$11,251,916)	\$11,917,927	\$145,461,098	\$145,874,994	(\$413,895)
					Contingency		\$21,788,902	\$21,375,006	
					Total US CMS Project		\$167,250,000	\$167,250,000	
Cumulative Data					Calculations Based Upon EAC				
Total US CMS Obligations to Date				\$107,994,698	Remaining Work (ETC) = EAC - BCWP				\$43,225,453
Schedule Performance Index (SPI = BCWP/BCWS)				90%	Contingency % = (Contingency / (EAC - BCWP))				49%
Cost Performance Index (CPI = BCWP/ACWP)				113%	Program Completed % (BCWP/ EAC)				70%

Cost Performance Report for Current Month Ending August 2002							
WBS	BCWS	BCWP	ACWP	SV	CV	BAC	CLAC
1 - EMU	\$693,208	\$225,637	\$724,988	(\$467,572)	(\$499,352)	\$1	\$966,027
2 - HCAL	\$441,603	\$86,621	\$134,743	(\$354,981)	(\$48,121)	\$18,264	\$818,746
3 - TRIDAS	(\$74,388)	\$47,893	\$72,058	\$122,281	(\$24,165)	(\$114,794)	\$175,666
4 - ECAL	(\$893,697)	(\$121,846)	\$25,826	\$771,852	(\$147,672)	\$61,602	\$8,534
5 - FPIX	(\$234,120)	\$35,893	\$54,869	\$270,013	(\$18,976)	\$20,785	(\$44,047)
6 - CP	\$19,492	\$7,816	\$7,744	(\$11,676)	\$72	\$0	\$0
7 - PO	\$58,756	\$48,177	\$47,127	(\$10,579)	\$1,050	\$0	\$38,876
8 - SITRK	\$40,421	\$1,621	\$4,915	(\$38,800)	(\$3,294)	\$4,715	\$238
0 - US CMS	\$51,275	\$331,811	\$1,072,269	\$280,537	(\$740,458)	(\$9,426)	\$1,964,040

CR/CO Monthly Log in AY\$ - All Changes

US CMS MONTHLY CHANGE CONTROL ACTIVITY					AY\$ BAC Jul-02	CHANGE\$	AY\$ BAC Aug-02
VER	DESC.	C PR	Brief Description Change	Percentage			
1.1	End User			0.00%	\$39,146,710	\$0	\$39,146,710
1.2	End User		Slight increase in the U of Minnesota and in some small areas. No paper work required.	0.04%	\$41,053,944	\$18,234	\$41,072,178
1.3.1	Trigger	TR-011-2001	The removal of the physical installation and submission of the revised ASX has reduced the project cost, partially offset by the loss in program engineering supply at Wisconsin.	-1.34%	\$38,541,914	(\$114,794)	\$38,427,120
1.3.2	Change			0.00%	\$38,541,914	\$0	\$38,541,914
1.4	End User	UCAL-015-2001	See change request report for detailed additions in the ECAL project. Also additional funds added in low estimated cost in some services.	0.49%	\$12,924,260	\$61,602	\$12,985,862
1.5	End User		Schedule date changes. No paper work required.	0.29%	\$2,046,303	\$30,725	\$2,077,028
1.6	Cost Plan			0.00%	\$23,000,000	\$0	\$23,000,000
1.7	Project Office	PO-013-2001	Change request to a reduction in US CMS Materials.	0.00%	\$4,783,309	\$0	\$4,783,309
1.8	STA		Administrative changes. No paper work required.	0.14%	\$3,313,051	\$4,715	\$3,317,766
1.9	CMC SAC			-0.01%	\$145,470,323	(\$9,436)	\$145,460,887
Consistency					\$21,779,473	\$9,436	\$21,788,909
TO TOTAL CO-02					\$457,590,000		\$457,590,000

Notes:

1. Copies of all Change Requests are maintained in the U.S. CMS Project Office, and are available upon request.
2. Supporting documentation (Change/Error Logs, Cost Performance Reports, etc.) is also maintained in the U.S. CMS Project Office and is available upon request.
3. Any changes to the cost, schedule and/or technical baseline of the U.S. CMS Project are approved in accordance with the U.S. CMS Project Management Plan.

DOE/NSF PM and FNAL DD CMS Milestones

Agency Project Manager and FNAL Deputy Director (APMDD) milestones are under Change Control as described in the US CMS PMP. Below are shown the proposed v33 milestones as compared to the v31 approved milestones. Variances are in days (250 days/yr).

System	Level	CMR ID	Milestone	Ver	Start	Finish	Ver	Start	Finish	Ver	Start	Finish
US CMS Agency FMA / FNA / F												

Metric #2. U.S. CMS Monthly Reporting into the DOE PARS

Project Assessment & Reporting System														
◀ Back		Home Find Create Help View Quad Chart												
		Edit		Delete										
Project ID:	696													
DOE Project ID:	XX-SC-XXX-2													
DOE Project Name:	U. S. CMS													
Project Acronym:	CMS													
Managing Office:	Science													
Project Size:	Other													
Project Category(s):	<table><thead><tr><th></th><th>Project Category</th></tr></thead><tbody><tr><td>1.</td><td>System</td></tr></tbody></table>					Project Category	1.	System						
	Project Category													
1.	System													
Project Location:	The Large Hadron Collider (LHC) is being built at the European Laboratory for Particle Physics (CERN) outside Geneva, Switzerland. U.S. CMS project efforts supporting LHC CMS detector construction occur at Fermilab and U.S. Universities.													
Project Description (Short):	The LHC will include the accelerator and two very large detectors (CMS and ATLAS). The LHC will collide two proton beams at a center-of-mass collision energy of 14 TeV, the world's highest. The collision products will be detected and recorded by the detectors and studied by international collaborations, including the U.S. The U.S. CMS Project consists of design, fabrication and provision of particular detector technical components or sub-systems to CERN for the CMS detector.													
Project Mission Need (Short):	This project is driven by the need to continue progress in high-energy physics at the high-energy frontier. The overriding mission is to seek deeper insights and pursue new ways to explore and understand the nature and interactions of matter and energy at the most fundamental level. The LHC, designed to be the highest energy accelerator ever built, will be the only facility in the world able to address many critical questions in the field.													
Project Objectives:	The primary objective of this project is to assist CERN and the CMS collaboration in the construction of the CMS detector by providing equipment and technical support. Secondary objectives are to provide significant opportunities to the US Nat'l Labs and US Universities to maintain and improve their capabilities in this field, and to advance international cooperation in the construction of large science projects.													
Project Start Date:	10/31/1995													
Project Completion Date:	09/30/2005													
Active/Inactive:	Active													
Project Cost/Funding:	<table><thead><tr><th></th><th>PDS Fiscal Year</th><th>Total Project Cost (\$K)</th><th>Total Estimated Cost (\$K)</th></tr></thead><tbody><tr><td>1.</td><td>1998</td><td>167,250</td><td>167,250</td></tr></tbody></table>					PDS Fiscal Year	Total Project Cost (\$K)	Total Estimated Cost (\$K)	1.	1998	167,250	167,250		
	PDS Fiscal Year	Total Project Cost (\$K)	Total Estimated Cost (\$K)											
1.	1998	167,250	167,250											
Prime Contractor:	Universities Research Association													
Contact(s):	<table><thead><tr><th></th><th>Contact Type</th><th>Name</th><th>Phone</th><th>Email</th></tr></thead><tbody><tr><td>1.</td><td>Program Manager</td><td>John R. O'Fallon</td><td>301-903-3624</td><td>john.ofallon@science.doe.gov</td></tr></tbody></table>					Contact Type	Name	Phone	Email	1.	Program Manager	John R. O'Fallon	301-903-3624	john.ofallon@science.doe.gov
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	2.	DOE Project Manager	Jim Yeck	630-840-2530	Jim Yeck																																																																																				
	3.	DOE Project Manager	Pepin Carolan, Deputy Project Manager	630-840-2227	Pepin Carolan																																																																																				
	4.	Contractor Project Manager	Terry Grozis, Project Support	630-840-3854	Terry Grozis																																																																																				
	5.	Contractor Project Manager	Mark Reichanadter, Deputy Project Manager	630-840-8205	Mark Reichanadter																																																																																				
<p>Earned Value:</p> <table border="1"> <thead> <tr> <th></th> <th>Fiscal Year</th> <th>Month</th> <th>BCWS (\$K)</th> <th>BCWP (\$K)</th> <th>ACWP (\$K)</th> </tr> </thead> <tbody> <tr><td>1.</td><td>2001</td><td>July</td><td>92,477</td><td>78,548</td><td>73,552</td></tr> <tr><td>2.</td><td>2001</td><td>August</td><td>1,097</td><td>1,103</td><td>1,236</td></tr> <tr><td>3.</td><td>2001</td><td>September</td><td>3,624</td><td>5,649</td><td>1,774</td></tr> <tr><td>4.</td><td>2002</td><td>October</td><td>3,637</td><td>1,561</td><td>1,690</td></tr> <tr><td>5.</td><td>2002</td><td>November</td><td>1,470</td><td>3,399</td><td>1,003</td></tr> <tr><td>6.</td><td>2002</td><td>December</td><td>-502</td><td>772</td><td>2,293</td></tr> <tr><td>7.</td><td>2002</td><td>January</td><td>1,676</td><td>1,504</td><td>759</td></tr> <tr><td>8.</td><td>2002</td><td>February</td><td>2,710</td><td>2,420</td><td>1,345</td></tr> <tr><td>9.</td><td>2002</td><td>March</td><td>405</td><td>942</td><td>35</td></tr> <tr><td>10.</td><td>2002</td><td>April</td><td>2,404</td><td>2,643</td><td>1,739</td></tr> <tr><td>11.</td><td>2002</td><td>May</td><td>1,143</td><td>618</td><td>1,055</td></tr> <tr><td>12.</td><td>2002</td><td>June</td><td>926</td><td>1,420</td><td>2,132</td></tr> <tr><td>13.</td><td>2002</td><td>July</td><td>2,783</td><td>1,738</td><td>1,047</td></tr> </tbody> </table>							Fiscal Year	Month	BCWS (\$K)	BCWP (\$K)	ACWP (\$K)	1.	2001	July	92,477	78,548	73,552	2.	2001	August	1,097	1,103	1,236	3.	2001	September	3,624	5,649	1,774	4.	2002	October	3,637	1,561	1,690	5.	2002	November	1,470	3,399	1,003	6.	2002	December	-502	772	2,293	7.	2002	January	1,676	1,504	759	8.	2002	February	2,710	2,420	1,345	9.	2002	March	405	942	35	10.	2002	April	2,404	2,643	1,739	11.	2002	May	1,143	618	1,055	12.	2002	June	926	1,420	2,132	13.	2002	July	2,783	1,738	1,047
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9.	2002	March	405	942	35																																																																																				
10.	2002	April	2,404	2,643	1,739																																																																																				
11.	2002	May	1,143	618	1,055																																																																																				
12.	2002	June	926	1,420	2,132																																																																																				
13.	2002	July	2,783	1,738	1,047																																																																																				
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<p>Project Status:</p> <p>The U.S. LHC CMS project is ~69% complete. Cost performance is good, with no major slippages in schedule progress . Good technical progress continues, and we remain confident that the US deliverables to CERN/CMS can continue to be realized with the planned funding.</p> <p>(NOTE: Project Cost/Funding data above includes NSF funding for FY99-FY03)</p>																																																																																									
<p>Created by: Paul Philp</p> <p>Updated by: Pepin Carolan</p> <p>Create date: 10/23/2001 10:15:58AM</p> <p>Last update: 09/27/2002 04:22:05PM</p>																																																																																									
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Metric #3: DOE/NSF reviews of the U.S. CMS Project. Excerpts of the latest close-out report follow;

“The Department of Energy (DOE) and the National Science Foundation (NSF) conducted a review of the U.S. CMS Construction project on June 5-6, 2002. The review was undertaken at the request of the co-Chairpersons of the U.S. Large Hadron Collider (LHC) Joint Oversight Group, Dr. John R. O’Fallon, Director, DOE Division of High Energy Physics, and Dr. John W. Lightbody, Jr., Physics Division, NSF Mathematical and Physical Sciences Directorate. The Review Committee was charged to assess technical progress in each subsystem, progress towards completing the U.S. deliverables on schedule, newly revised plans for pre-operations (2002-2004), adequacy of the updated cost to complete and project contingency.

The Compact Muon Solenoid (CMS) will be a large, general-purpose detector used to observe very high-energy proton-proton collisions at the LHC, now under construction at CERN, the European Laboratory for Particle Physics, near Geneva, Switzerland. The detector is being built by a large international collaboration, including over 335 U.S. physicists from 35 universities and Fermi National Accelerator Laboratory. The U.S. CMS collaborators comprise twenty percent of the CMS collaboration and will provide a comparable fraction of the detector components. U.S. physicists are participating in many aspects of the detector design and fabrication, including important management roles.

The U.S. has taken responsibility for well-defined CMS detector subsystems and collaborating on other items defined as CMS common projects. The U.S. has management responsibilities within the international CMS collaboration for the Hadron Calorimeter, the end cap muon system, and the trigger.

Since the last review in May 2001, the U.S. CMS project continues to make excellent technical progress toward completing the deliverable items before the end of FY 2005. As reported at the end of April 2002, the project is 69 percent complete. It is expected that the U.S. scope will be completed in time to meet CMS requirements.

U.S. CMS maintains a Total Project Cost (TPC) estimate of \$167.25 million. The project cost baseline includes a 53 percent overall contingency for the remaining work. The total contingency amount appears to be reasonable and adequate to complete the project. Overall, cost and schedule performance indices suggest the project is slightly behind schedule and is under-running costs. However, cost and schedule variances are well understood and are proactively monitored by management.

Overall the schedule is reasonable and schedule progress has been good. The Committee supports the Project’s decision and actions to maintain the baseline schedule despite the CERN LHC schedule slippage. All disks of the Endcap Iron were completed and erected in the CMS assembly area in mid-March 2002 on budget and cost—a job well done.

However, several subcommittees identified technical issues that create schedule risk for several components. Many of these potential delays are known by the project team and have been quantified and documented.

Overall, the project appears to be making good progress. The strong management team is to be commended for their exemplary application of established project management tools. There is a close working relationship between the U.S.CMS project, the CMS collaboration leadership, and CERN.

The DOE and NSF conducted a review of the U.S. LHC Research Program maintenance and operations (M&O) component on April 9-11, 2002. While additional attention was devoted to scrubbing the requirements and costs associated with the activities necessary to maintain and operate the detector equipment, the Committee believes the collaboration must review each CMS maintenance and operation element in greater detail with intent to reduce the overall M&O budget.

In conclusion, the U.S. CMS construction project continues to make impressive technical progress and to maintain an adequate contingency budget. The Committee urges the project to maintain its excellent technical progress and to work with other collaborators in a manner to make certain that U.S. and collaboration physicists deliver a detector that is functional for the intended physics research purposes. Success will depend in large part on the execution of an effective end game plan that guides the project transition from construction through assembly and installation to start-up operations. The design and implementation of the end game plan will be a major focus of the next full review.”

Metric #5: U.S. CMS Construction Project Base Program Needs Assessment

Institution	Subsystem							FY'01 Request		Total Request	L2 Priority	L1 Priority	L1 Comment		
	EMU	HCAL	Trig	DAQ	ECAL	FPixel	SiTrk	DOE	NSF						
Boston	SRA	PD						80.0		80.0		1	HCAL Electronics - CP		
Rice			PD					60.0		60.0		1	Faculty resolved - PD support needed, Lehman		
Florida			GS					75.0		75.0	1	+	3	EMU first installation in FY02, university matching	
UC Santa Barbara							PD	80.0		80.0		1		4.0	setup of alternate to SiDet, university program
UC San Diego (DOE)					PD			80.0		80.0		1		5.0	repeat, Lehman recommendation
Caltech						PD		80.0		80.0		1		6.0	test beam in FY02 is ECAL CP
Purdue - Shipsey							EE/Tech	80.0		80.0		1		7.0	setup of second assembly line - matching, Run IIb
Kansas								PD		80.0		2		8.0	Tests on SiTrkr needed to start construction
Maryland (DOE)			PD						80.0		80.0		2	9.0	Physics group - US leadership
Wisconsin				PD					60.0		60.0		2	10.0	repeat, Lehman recommendation
Total								675.0	80.0	755.0					

Metric #6: U.S. CMS Detector Project Website

